

Research needs to support continuing improvement of asset management practices

Towards an Economic Decision Methodology for Remaining Asset Life: Research Roadmap (SAM1R06g)

The Central Issue

Wastewater utilities provide essential services through a variety of long- and short-lived assets. The life of many of these assets could potentially be extended with a better understanding of what influences asset life. Extending the life of assets by even a small amount has the potential for saving significant amounts of money.

Context and Background

This roadmap is one component of the WERF research on remaining asset life. The first stage involved a state-of-the-art review of remaining asset life for all wastewater assets (SAM1R06d, 2009). Upon completion of that study, it was clear that the application of tools and techniques for assessing and predicting remaining asset life had to be undertaken within a holistic framework that could be applied by utilities of different sizes and at different stages of their asset management development. Given the nature of the water sector, a decision support framework based on economic principles was considered to be the most appropriate approach.

Findings and Conclusions

The roadmap provides an overview of research needed to support broader asset management capacity building effort, and the following areas were considered as particularly high priority by the research team:

- Standardizing terminology.
- Standardizing pragmatic approaches.
- Modeling of deterioration at the asset level through the network level using a top-down, bottom-up approach to align the analysis undertaken at each level.
- Modeling of failure consequence, including consideration of the probability distribution of consequences (especially the treatment of high consequence/low probability events).



Asset Management Capacity Building Process.

- Producing industry standard approaches for valuing externalities, and agreement on template values to be used in justification of investment decisions.
- Producing industry standard approaches to weightings used in prioritization schemes and multi-criteria analysis.
- Creating protocols for decision support, with guidance on proportionality.
- Demonstrating the use of different models for O&M (prioritizing for inspection and maintenance), tactical asset management (prioritizing for replacement and selection of intervention), and strategic asset management (understanding overall budget needs, modeling network and asset deterioration, and setting service levels).

This research presents the next level of strategic asset management with an emphasis on the economic decisions. A key aspect of economic decision making for an existing asset stock is how to take into account deterioration and assess the relative risks of retaining an asset or undertaking a capital intervention. The *Practitioner's Guide to Economic Decision Making* (SAM1R06b) examines aspects relating to asset deterioration and the analysis required to understand risks associated with different intervention options, including the 'do nothing' option.

Management and Policy Implications

This research needs roadmap presents the current state of the practice as conceived by the researchers and the desired state with full economic decision making. If this research is carried out it will help to build asset management capacity with respect to remaining life, by embedding core principles into tools and approaches, based on a continual development model of knowledge generation, tool development, and industry training and engagement. It also will improve financial and economic performance of the U.S. water sector when viewed from the perspective of water utilities and the communities they serve, allowing these funds to be used elsewhere to the benefit of customers and the environment.

Executive Summary



Towards an Economic Decision Methodology for Remaining Asset Life

Related WERF Research	
Project Title	Research Focus
SIMPLE: Sustainable Infrastructure Management Program Learning Environment) (03CTS14)	This online knowledge base enhances the ability to train personnel and provide guidance and tools to utilities of all types, sizes, and levels of practice in asset management. SIMPLE contains over 16,000 pages of best practices developed over a 20-year period and from international experience and collaboration with asset management practitioners.
Condition Assessment Strategies and Protocols for Water and Wastewater Utility Assets (03CTS20CO)	Provides information on how to effectively use condition assessment tools and techniques to improve both long-term planning and day-to-day management of assets. The report is structured for two distinct audiences: <ol style="list-style-type: none"> 1) Utility planning managers who want to use cost-effective condition and performance assessment programs to support long-term planning decisions. 2) Engineering/maintenance managers that want to identify and understand the advantages and disadvantages of tools and techniques for measuring the condition and performance of utility assets to support daily maintenance and operation of assets.
Remaining Asset Life: A State of the Art Review (SAM1R06d)	Synthesizes the broad range of factors that influence remaining asset life. Covers the state of knowledge with respect to the estimation and prediction of remaining asset life, and if there is the capacity to translate between condition and performance data (e.g., the presence of significant defects) and the residual life of an asset.
Leading Practices for Strategic Asset Management (SAM1R06h)	Identifies, documents, and validates leading practices through site visits and a research forum held in 2010. Leading practices are presented in an easy-to-follow format that cites and explains the practice and provides examples. This research is intended to assist utility managers in the practice areas of Organization and People, Strategic Asset Planning, Business Risk, Maintenance, Secondary Data and Knowledge, and Accounting and Costing.
Predicting the Remaining Economic Life of Wastewater Pipes Phase I: Development of Standard Data Structure to Support Wastewater Pipe Condition and Performance Prediction (SAM3R06)	Information about wastewater pipe failure modes and mechanisms that can occur during design, manufacture, construction, operation and maintenance, and repair, rehabilitation, and replacement. Provides standard data structure and data collection methods that enable effective and systematic data collection and data storage as part of an asset management program and for analyzing the performance of wastewater pipe infrastructure systems. Includes five case studies that describe an overview of a city's wastewater system, utility data collection, and utilities' GIS capabilities.

Principal Investigators:

David Marlow, Ph.D.
CSIRO
 Anthony Urquhart, CPEng.
MWH

Research Team:

David Beale, Ph.D.
CSIRO

Technical Reviewers:

Fay Costa
Metropolitan Water Reclamation District of Greater Chicago
 Sanjay Patel
Metropolitan Water Reclamation District of Greater Chicago
 Terry Martin
Seattle Public Utilities

Greg Kane
Sydney Water Corporation
 Kendall Jacob, P.E.
Cobb County Water System
 Ted Regan
Massachusetts Water Resources Utility
 Steve Krai
Los Angeles County Sanitation District
 Steve Whipp
United Utilities North West

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 For more information, contact
 Walter Graf at wgraf@werf.org.

